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BELGIAN CONGO RAILROADS

NEW RAIL LINE TO CONNECT KAMINA AND KABALO -- Leopoldville, Le Courrier d'Afrique, 16 Oct 52

Under the Belgian Congo's Ten-Year Plan, a 445-kilometer rail line will be built between Kamina and Kabalo to link the BCK (Chemin de Fer du Bas Congo au Katanga, Lower Congo Railroad of Katanga) and the CFL (Chemin de Fer du Congo Superieur aux Grands Lacs Africains, Upper Congo Railroad of the African Great Lakes).

The connecting line will consist of two sections: a 250-kilometer section between Kabalo and Kabongo to be built by the CFL and a 195-kilometer section between Kabongo and Kamina to be built by the BCK. Once the Kamina-Kabongo line is constructed, the eastern part of the Belgian Congo will be connected to Sakania and Port Francqui, i.e., to the southern and western parts of the colony. Furthermore, Albertville and Kindu will be connected directly to the railroad systems of Southern Rhodesia, the Union of South Africa, and Angola.

Construction of the new line will require the excavation of 3,700,000 cubic meters of earth, of which 2,600,000 cubic meters will be done by the CFL. A total of 700 meters of bridge construction will be necessary. The BCK will do the major part of this work, including a 600-meter rail and highway bridge across the Lualaba River at Zofu, south of Kabalo. Large-scale excavation will begin in January 1953, and work on the Zofu bridge will begin the following June.

The necessary railroad materiel has been ordered in Belgium. Beginning in April 1953, 10 kilometers of track will arrive each month. It is estimated that the new line will require 3 years to build while construction of the Zofu bridge and its approaches will require 3½ years.

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Elisabethville, Essor du Congo, 7 Nov 52

Following the construction of the Kamina-Kabalo rail line, the CFL will be faced with the difficult task of changing the gauge of its tracks from 1.00 meter to 1.067 meters to conform to the gauge of the BCK, Rhodesian Railways, South African Railways, and the Benguela Railroad.

The Kamina-Kabalo connecting line will have a maximum grade of 1.25 percent in curves and a minimum curvature radius of 500 meters. The line will have some aqueducts and 4,500 meters of water pipes and conduits.

Contracts for excavation, bridge construction, and other foundation work will be assigned to Belgian and Congolese firms. However, the CFL itself will lay the roadbed and track for which it is responsible. /Source does not indicate whether the BCK will follow a similar procedure./

Two physicians, two sanitation agents, and a number of native nurses and attendants will be assigned to the project. In addition, stationary and mobile hospital units with a combined capacity of 100 beds are to be placed in service.

DATA ON THE BCK RAILROAD -- Elisabethville, Essor du Congo, 20 Oct 52

Following is a summary of the various categories of rolling stock which will be in operation on the BCK at the end of 1952:

Road Locomotives	No of Units
Steam	128
Diesel-electric	
C-C type	2
Bo-Bo type	8
Switching Engines	
Steam	28
Electric and diesel	7
Total	173

Most of the steam locomotives are of the Mikado (2-8-2) and Mountain (4-8-2) types, with an axle load of 15 tons. However, in the near future, a Mountain-type locomotive with a 17-ton axle load will be put in service. Also in service are the following:

Freight, Passenger, and Other Cars	Units
Boxcars	646
Gondolas and flat cars	1,432
Hopper cars	418
Special cars	92
Service cars and coaches	165

Freight, Passenger, and Other Cars	Units
Passenger coaches and baggage cars	75
Rail motorcars	2
Total	2,830

The BCK has a complex of repair shops in Elisabethville. These shops use the assembly-line method. The locomotive shops are equipped to perform ten large repair jobs monthly. The car shops perform 625 lubrication and 50 repair jobs monthly.

Fuel

During 1951, the BCK's fuel consumption was as follows:

Fuel	Volume
Wood (cubic meters)	915,000
Coal, local (tons)	103,000
Coal, imported (tons)	34,000

Wood is still the most important fuel used by the BCK, despite the inconveniences involved in its use. Formerly, this fuel offered the advantages of low cost and easy supply from local sources. These advantages have been partially offset by rising costs and the shortage of native manpower. These factors, plus the increased cost of imported coal, have caused the BCK to electrify some sections of its network.

Electrification

The 200-kilometer section between Jadotville and Kolwezi is particularly well suited to electrification for the following reasons: (1) the section runs through an industrial region which is intersected at various points by 120-kilovolt power lines of the Union Miniere du Haut Katanga (United Mines of Upper Katanga); (2) its traffic is heavy; and (3) its present fuel consumption is high. Electrification of the Jadotville-Kolwezi section is now well under way, and test runs, using single-phase, 25,000-volt, 50-cycle current, are already being made between Jadotville and Tenke. Work has also been started on the section between Tenke and Kolwezi.

Personnel and Organization

At present, the BCK has nearly 700 European employees, including 12 physicians, 35 civil engineers, and 18 consulting engineers. The 700 figure includes personnel engaged in administration, research, and purchases in Belgium. The company also employs 14,500 natives who are engaged in regular operations and new projects.

All European and native employees serving in the Belgian Congo receive free housing and medical care for themselves and their families. Hospitals and dispensaries are maintained by the company. In addition, the BCK provides primary education and vocational training for the children of native employees. Recently, a vocational school was established by the BCK at Jadotville.

The organizational development of the BCK has paralleled its increasing traffic and responsibility. The present trend is toward decentralization of the operational units, increased responsibility at the regional and local level, and specialization of technical services.

FIRST ELECTRIFIED SECTION ON THE BCK RAILROAD -- Elisabethville, Essor du Congo, 21 Oct 52

On 18 October 1952, Taymans, chief engineer of the BCK at Jadotville, presented a discussion of the new electrified section between Tenke and Jadotville before a group of colonial officials. Summary of his talk follows.

Feeder Stations

At present, all electric power in Katanga comes from the power stations at Francqui and Bia. Power is transmitted on 110-kilovolt lines to Elisabethville, via Chila-Tembo, to Jadotville, and to Kolwezi. Another line connects Jadotville to Elisabethville via Chila-Tembo. Toward the end of 1952, the power station at Delcommune will go into service, and connections with the aforementioned power stations will be made through the distributor station at Shituru.

To reduce initial expense, it was necessary for the BCK to place its substations as close to the power transmission lines as possible. Accordingly, the two substations which feed the Jadotville-Tenke section are located at Fungurume and at the SOGELEC (Societe Generale Africaine d'Electricite, General African Electric Company) plant at Shituru. The distance between these two points is 79 kilometers.

The 105-kilometer section between Jadotville and Tenke is divided into three parts. The Jadotville-Mulungwishi segment is fed by the Shituru substation; the Mulungwishi-Fungurume segment and the Fungurume-Tenke segment are fed by the substation at Fungurume. The three segments are fed by different phases of the general transmission lines at 110 kilovolts so as to distribute the load and reduce inequalities. Since the power required for electric traction is quite low, compared with the requirements for the industrial installations of the Union Miniere du Haut Katanga, studies show that such inequalities, even under the most unfavorable circumstances, would not be sufficient to cause trouble.

Between segments, a neutral zone has been set up on the high-tension line so that locomotive pantographs, in passing from one segment to the other, will not create a short circuit between phases. The substations consist of single-phase 110/25-kilovolt transformers set in protective housings.

The electrical equipment at the Fungurume substation includes a three-pole switch with ground, a three-pole circuit breaker, transformer boosters, a lightning conductor, and the distribution switchboard for the two service lines and the reserve line. Each line has a switch and a two-pole, 110-kilovolt circuit breaker; a 110/25-kilovolt transformer with a nominal power of 6,000 kilovolt-amperes at the secondary winding; and a two-pole, 25-kilovolt switch, one pole of which is connected by the ground bar to the rail, while the other pole is joined to the catenary-line feeder through a circuit breaker. The latter is equipped with a device which automatically restores the connection of the principal circuit breaker if the interruption of current is only momentary.

The Fungurume substation will normally be controlled from Jadotville. Equipment-position indicator signals from the substation, as well as the remote control of the switches and circuit breakers of the substation, will be accomplished by a system of rotating selectors. The three wires which control the system have been included in the interstation underground telephone cable.

A switchboard at each station will permit cutting off the station system without interfering with the main lines. Power for signal and lighting circuits at the stations will be available locally at a later date by installation of 25,000/220-volt transformers.

The Catenary

The simple 22,000-volt catenary used by the BCK is composed of a bronze suspension cable, 84 square millimeters in section, with 70 precent conductibility, and with a copper contact wire, 107 square millimeters in section, making a total in copper equivalent to 166 square millimeters in section. The suspension cable is hung on the pole arms by three cap-and-pin insulators, and the contact wire is kept in place by 5-cap, nonswinging insulators.

On straight track, the catenary is of the polygonal type, with the contact wire practically on the same vertical plane as the suspension cable. On curves, the catenary is inclined and the hangers which hold the contact wire to the suspension cable have a variable inclination corresponding to the radius of curvature.

By way of experiment, a section of track has been provided with an undulating catenary, with the catenary supports placed on alternate sides of the track. Between each support, the inclination of the catenary is varied, the contact wire describing a sinusoid on the horizontal plane.

The catenary supports are made of Grey girders. Distance between supports is 60 meters on the straightaway and decreases to 50 or 40 meters on curves, according to the radius of curvature. The contact wire is provided with a counterweight every 1,200 meters to assure a constant tension of 1,100 kilograms.

Use of an inclined catenary on curves permits maintaining a distance of 40 meters between supports, even when the radius of curvature drops to 200 meters. With the use of a polygonal catenary, the supports would have to be much more closely spaced.

Telephone System

Because of the high-tension traction lines, all telephone cables must be laid underground. The telephone cable laid by the BCK consists of eight 13/10 star-quad cables for telephone, telegraph, and remote control of the substations, divided as follows: two pairs of 20/10 for the Webb-Thompson electric block circuits and two pairs of 13/10 in reserve. The telephone lines have been laid in a Pupin cable throughout the entire length of 1,337 meters /sic; kilometers?/. Every 600 meters, connections have been made to stanchions placed along the right of way. These stanchions are provided with outlets which permit attachment of a portable telephone set and communication with the control office.

Electric Locomotives

The locomotives chosen for this service are the electric Bo-Bo type; that is, two trucks with two driving wheels each. They have 1,680 horsepower and can pull loads of 550 tons at a speed of 45 kilometers per hour on a 1.25-percent grade. Maximum speed on a level run is 70 kilometers per hour; weight, 74 tons; length, 14 meters; and starting tractive force, 17,000 kilograms.

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Each axle is driven by a single-phase, series capacitor, double motor (2 x 210 horsepower) by means of a flexible transmission with hollow shaft and Secheron springs. The 22,000-volt current feeds through a high-tension circuit breaker to the first transformer winding (1,600-kilovolt-ampere transformer) and returns to the substation through the rails.

From the second transformer winding, current feeds through a set of 16 electric-pneumatic contactors and graduated tension coils to the four double-traction motors at a maximum tension of 480 volts. Each motor circuit consists of the brake traction commutator, the electropneumatic contactor, the two rotors of the double motor connected in series, the compensation winding, the auxiliary poles with shunt resistance, the reversing switch, and the principal inductor winding.

In addition to the vacuum brakes, the locomotive is equipped with compressed-air brakes and electric brakes which hold the train at the authorized speed of 45 kilometers per hour on descending grades and at the same time save wear on the brake shoes.

The auxiliary services of the locomotive are fed by a single-phase, 380-volt current from the secondary winding of the power transformer, and include the motor ventilators, the compressors, vacuum pumps, transformer oil-cooling equipment, circulation pump, and ventilator. The locomotives are equipped with a dead man's control.

These locomotives can also be used in multiple units, with the controls handled entirely by the leading locomotive. The trucks are of the single-block type, entirely welded, and have a double-suspension stage of leaf springs. The locomotives have controls at both ends. The latter is kept at slightly higher than normal pressure to avoid infiltration of dust. The high-tension compartments are protected by a grill, and a locking system prevents access to them while the pantograph is in contact with the catenary wire.

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